MANUAL
FOR CONTROLLER

GH10NA

FOR CONTROLLING CENTRAL HEATING BOILERS WITH AIR BLOW

Program version: 01

USER MANUAL

We request that users carefully study applicable Instructions before connecting and starting up any of our products.
Should any doubts arise, please contact our Company between 8 a.m. and 4 p.m.
Attention !!! At the bottom of each page you will find last document's update date. Please, always use the most recent version of the Instructions, which is available free of charge and will be mailed to you if ordered.

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1. INTRODUCTION

1.1. Graphic symbols

Symbols intended to indicate and at the same time emphasise the importance of text containing information that warns against dangerous situation have the following graphic forms:

Warning

This symbol is used when it is necessary in described instructions to follow the sequence of carried out operations. The unit may be damaged or destroyed in case of any error or proceeding in discord with the description.

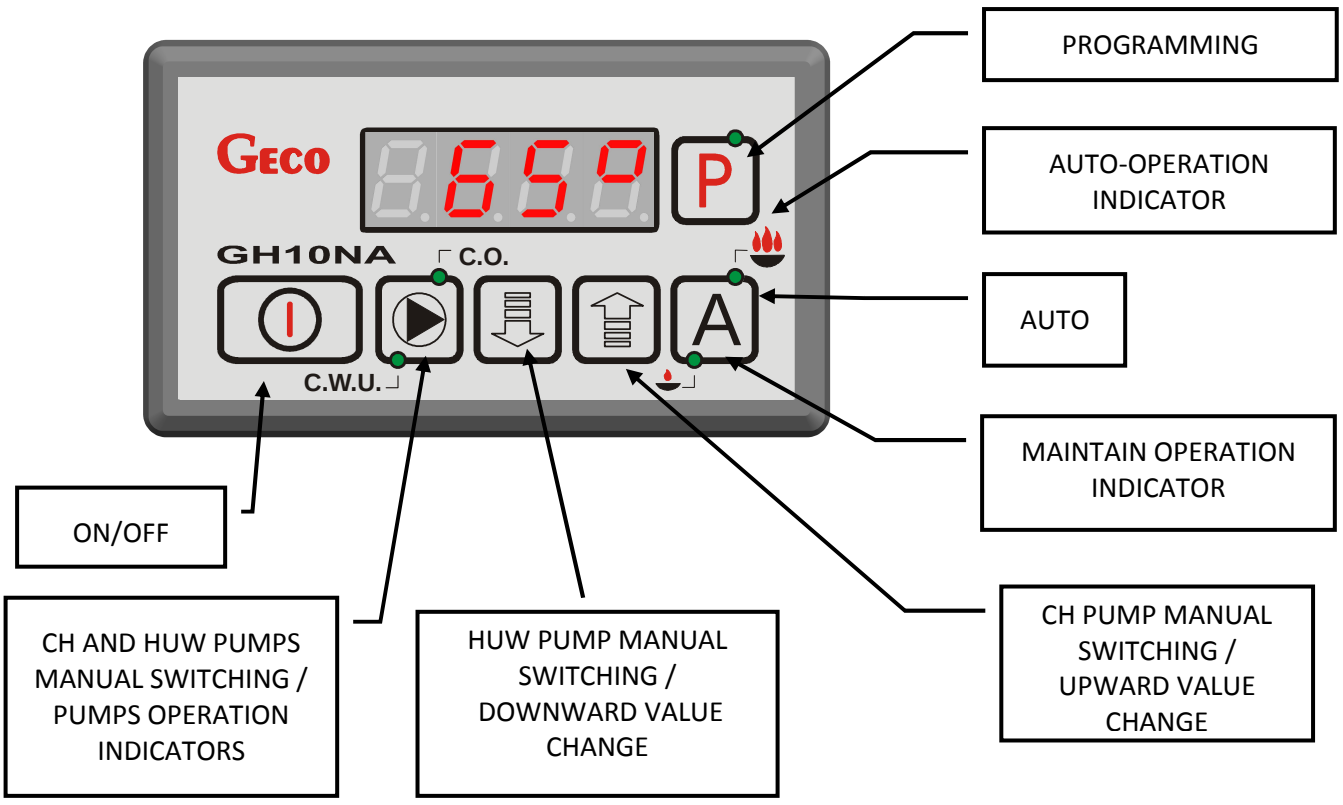
Important!

This symbol indicates information of particular importance.

Reference

This symbol indicates occurrence of additional information in a chapter.

1.2. Keyboard and Function Keys



2. GENERAL FEATURES

The GH10NA Controller is a microprocessor-based device manufactured using the Surface Mount Technology (SMT).

It is designed to control the processes of Hot Utility Water (HUW) heating and the main Central Heating (CH) water circuit. Control parameters can be adjusted to the current operating conditions and boiler type. The Controller includes a system protecting from power outages and other different disturbances.

The GH10NA Controller is fitted with:

- inputs:
    1. boiler output water temperature measurement (NTC sensor),
    2. HUW boiler water /return water temperature measurement (NTC sensor),
    3. Flue gas temperature sensor in chimney (PT1000 sensor),
- digital input:
    1. input for connection of the room thermostat panel.

It also contains four outputs allowing direct connection of 230 V AC devices, i.e.: fan, CH circulation pump, HUW pump or mixing pump, depending on the type of the controlled heating system (⇒ section **6**, page **7**).

ALWAYS DISCONNECT THE CONTROLLER FROM POWER DURING THUNDERSTORMS

3. TECHNICAL DATA

Power supply	230V AC +10% -15%	
Operating temperature range	+5°C to +40°C	
Humidity	20% to 80% RH	
Fan protection	2A	
Sensors type	NTC 2,2kΩ, PT1000	
Sensors operating temperature range	NTC:	0°C÷100°C
	PT1000:	0°C÷400°C

Output	Maximum continuous load	
HUW pump / mix pump	1A	200W
CH pump	1A	200W
Fan*	1A	200W

NTC sensor resistance characteristics	
Temp. °C	**Resistance Ω**
0	7174,89
10	4374,83
20	2747,10
30	1774,91
40	1172,09
50	795,08
60	547,95
70	384,62
80	275,86
90	202,37
100	149,16

PT1000 sensor resistance characteristics	
Temp. °C	**Resistance Ω**
0	1000,00
50	1194,00
100	1385,10
150	1573,30
200	1758,60
250	1941,00
300	2120,50
350	2297,20
400	2470,90
450	2641,80
500	2809,80
550	2974,90
600	3137,10

When a contactor or relay proxy is connected, use a dedicated blowout system (eg varistor). Omission of this security measure may result in malfunction or damage to the controller output.

4. ELECTRICAL SYSTEM AND CONNECTION RULES

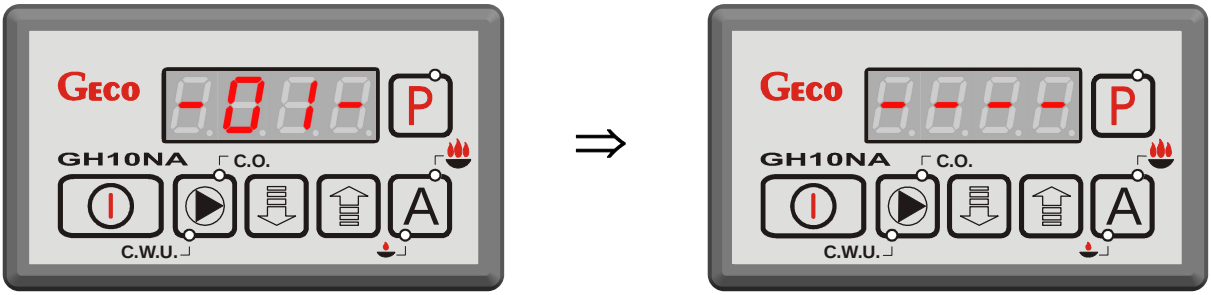
1. The boiler room should be equipped with a 230V/50Hz electrical system, according to the applicable regulations.
2. The electrical system (regardless of its type) should be terminated with a connection outlet fitted with a protective terminal. **Use of an outlet without a protective terminal causes electrical shock hazard!!!**
3. Connect the Controller to a separately installed power line protected with a properly selected quick circuit-breaker or a residual-current device (RCD breaker). **Do not connect any other devices to this line!!!**

THE CONTROLLER IS POWERED FROM 230V/50HZ MAINS
ANY REPAIRS MAY BE CARRIED OUT ONLY WITH POWER SUPPLY CUT OFF AT THE FUSE

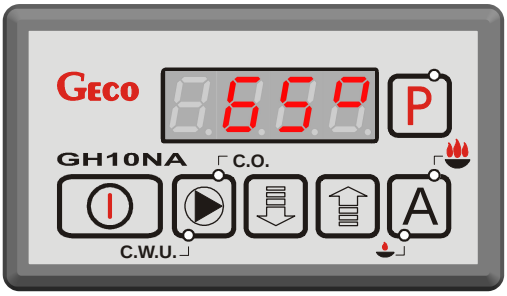
5. QUICK START

To quickly start the GH10NA Controller, perform the following actions:

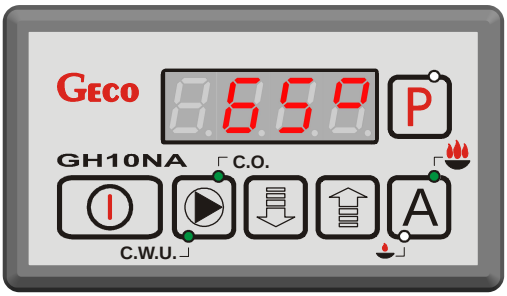
1. Connect the device to the 230V AC power system (put the plug in the power outlet).



2. Turn the Controller ON by pressing . Screen appears:



3. Press . Screen appears:



and the Controller starts automatic operation according to the factory settings.

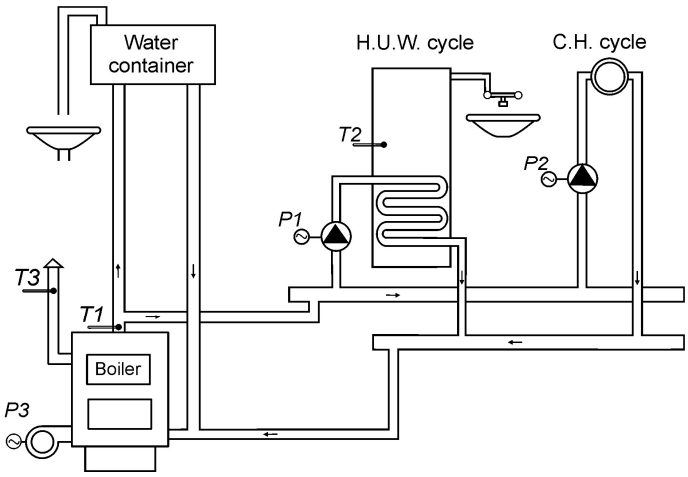
Table *1* Factory settings chart

User parameter	Description	Factory setting
U0	Boiler preset temperature	60^0C
U1	Fan speed	5
U2	HUW/return set temperature	40^0C
U3	Anti-Legionella function	Yes

6. THE GH10NA OPERATION

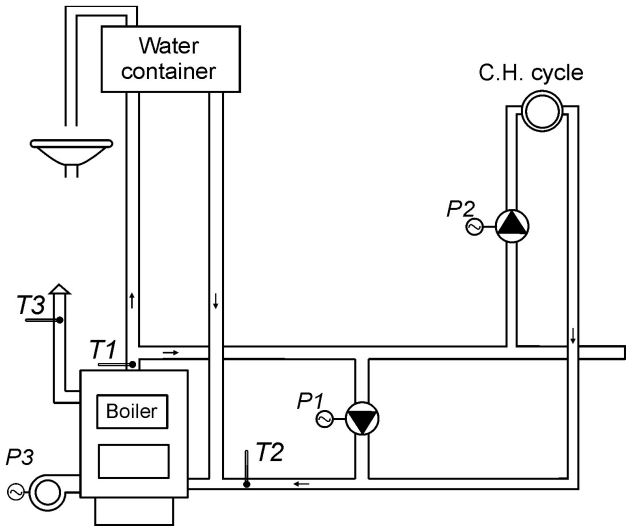
6.1. Operated Heating System

6.1.1. Central Heating cycle + HUW cycle



INPUTS	OUTPUTS
T1 – Boiler temp.	P1 – HUW pump
T2 – HUW temp.	P2 – CH pump
T3 – Flue gas temp.	P3 – Fan

6.1.2. Central Heating cycle + mixing pump



INPUTS	OUTPUTS
T1 – Boiler temp.	P1 – Mixing pump
T2 – Return temp.	P2 – CH pump
T3 – Flue gas temp.	P3 – Fan

6.2. Automatic operation mode.

By pressing A, you can turn on the automatic operation mode – the Controller lights the **upper** indicator on A ( ).

6.2.1. Fan

In the AUTO mode, the fan runs continuously until the boiler temperature reaches the value set by the user in the *U0* setting.
The fan starts with minimal speed (gear 1) and increase its speed according to **F31** parameter until getting to speed set in *U1* parameter (⇒ Table 1).

When flue gas temperature sensor is connected to the controller and it is activated (**F11** > 0), after exceeding flue gas temperature set in **F42** parameter the fan speed is reduced. This reduction is proportionate until the fan stops completely.

Activation and operation of the fan is indicated by means of a **vertical** line on the left side of the display, in the **lower** sign segment, on the Controller main display screen.

6.2.2. CH Pump

In the AUTO mode, the CH pump starts when the temperature of the boiler water is higher or equal to the value set in the **F06** service setting (factory setting is 40°C).

Turning the CH pump on and its operation is indicated by lighting the **upper** indicator on .

The Controller turns off the pump when the water temperature drops to the activation temperature minus 4°C. (If the CH pump start temperature is 40°C, then the CH pump stop temperature is 36°C).

6.2.3. Maintain Operation Mode

The Controller gets into that mode when the boiler temperature reaches the value set by the user in the *U0* setting.

This mode of operation is indicated by lighting the **lower** indicator on A ( ).

When set temperature is reached and **F32**=0, the fan will be turned on only for periodical blows. The duration of blow is consistent with the value set in parameter **F26**, and the fan works with maximum speed. The air blows take place at the time set in parameter **F27.**

When **F32** > 0 and the outlet water temperature does not exceed the value equal to the *U00* + **F33**, the fan works with speed set in **F32** parameter.

The Controller will exit the MAINTAIN mode and return to the AUTO mode if the boiler temperature drops to the value equal to the *U00* – **F05.**

The CH pump operates identically as in the AUTO mode.

6.3. Manual Operation Mode

Pressing causes the Controller to switch from automatic to manual mode, and immediately deactivates the fan, and the pump.

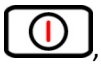
In this mode, you can manually and independently activate and deactivate the HUW pump and the CH pump.

To do this, follow the scheme below:

STEP 1		STEP 2	
	→		
Controller indicates water temperature measured on the boiler.		**HUW pump** **Lower** key indicator lights up. Press the key again to deactivate the pump and the indicator.	**CH pump** **Upper** key indicator lights up. Press the key again to deactivate the pump and the indicator.

HUW PUMP CAN BE TURNED ON ONLY IF IT IS SELECTED IN SERVICE PARAMETERS (⇒ SECTION 8.2, PAGE 13)

6.4. Viewing Temperatures

After pressing  , the display shows water temperature at the boiler outlet. Viewing temperatures: flue gas and HUW/return is available in the AUTO and MAINTAIN modes, but only if the flue gas sensor or HUW/return sensor are properly enabled.

Press to view the flue gas temperature. Press the key again to cancel the view. The view is also cancelled after 10s from pressing of the key.

Press to get a HUW/return temperature view. Press the key again to cancel the view. The view is also cancelled after 10s from pressing of the key.

6.5. Alarm Conditions

The Controller uses 6 different alarm conditions. In each alarm condition, the Controller displays the alarm number and activates the alarm sound output. In case of several alarm conditions occurring simultaneously, their numbers are displayed in sequence. You can exit an alarm condition only by pressing . This does not include the AL12 and AL7 alarm condition.

The damage of flue gas temperature sensor (AL7) will not cause enter into a state of alarm, the controller will work as in optimal flue gas temperature conditions. AL7 alarm signalling occurs only when viewing flue gas temperature (⇒ section 6.4). No sound signaling AL7.

Alarm conditions:

- **AL1** → STB activated or fuse blown
- **AL2** → Boiler water outlet temperature sensor failure
- **AL4** → HUW/return temperature sensor failure
- **AL7** → Flue gas temperature sensor failure
- **AL12** → Boiler overheating
- **AL13** → Boiler burnout

6.6. Power Failure

After a power failure the Controller starts to reactivate according to the condition it was in before the power down. The Controller waits 1 minute to stabilise the mains power parameters, and then restores operation with the previously programmed settings.

During the waiting period, the display shows time in seconds remaining until the end of the period, along with indication of its condition before the power outage:

- blinking "A" for AUTO mode,
- blinking "P" for MAINTAIN mode,
- blinking "r" for MANUAL mode.

Respective indicators (AUTO or MAINTAIN) are blinking along with the letters.

6.7. Boiler Burnout Detection

6.7.1. No Fuel

If during automatic operation the boiler outlet water temperature remains below the **F08** setting for a period of time set in the **F09** setting, then the Controller considers the boiler as "burned out" and enters the *AL13* alarm condition.
If during automatic mode for time set in **F9** parameter the flue gas temperature will be below value set in **F11** parameter, the controller recognizes that boiler has expired and *AL13* occurs.
When **F11**=0, this detection including flue gas temperature is disabled.

6.7.2. Sudden Drop of Outlet Water Temperature

If during automatic operation the boiler outlet water temperature drops by 10°C, and during that dropping period the temperature does not rise by 4°C, then the CH and HUW pumps are switched off, and the Controller goes into the burnout detection mode.

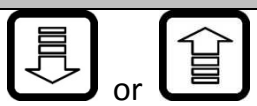
The Controller waits for the period of time set in the **F10** setting, during which it checks whether a rise of 4°C occurs.
If YES, then the burnout detection condition is stopped, and the CH and HUW pumps (if necessary) are started.
If NOT, this means that the furnace is burned out – the Controller enters the *AL13* alarm condition.

STOPPING CH PUMP OPERATION IN BURNOUT DETECTION IS INDICATED BY BLINKING THE UPPER INDICATOR ON ***.***

7. USER SETTINGS

7.1. Boiler Temperature Setting (U0)

You can change the boiler temperature setting using the following procedure:

STEP 1	→	STEP 2	→	STEP 3
				
Green LED lights on the key. Display shows current temperature setting.		Set a new desired temperature within range permitted by the boiler manufacturer.		Save the new temperature setting. Move to the U1 setting

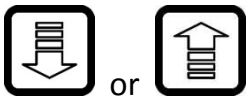
If during setting the new temperature none of the following keys is pressed for 15 s, the new temperature will not be saved and the Controller will exit the programming mode.

7.2. Fan speed (U1)

This setting determines the fan rotation speed, and thus the amount of air delivered. It allows to adjust the fan speed according to the type and quality of the fuel used.

This setting can be set within the range of 1÷10, where "1" denotes minimum speed, and "10" maximum speed.

You can change the setting using the following procedure:

STEP 1	→	STEP 2	→	STEP 3	→	STEP 4
						
Green LED lights on the key. Display shows the U0 setting value.		Move to the U1 setting.		Set the desired value.		Save the new setting. Move to the U2 setting.

7.3. HUW/ Return Temperature Setting (U2)

This setting is available to the user **only** if the HUW heating option or return temperature stabilisation are used, and the user configured the pump with the **F00** service parameter by setting it to the values "01", "02", "03", "04" (⇒ section 8.2 page 13). You can modify this setting in a similar way to the described in sections **7.1** and **7.2**. Settings are within the range of 35°C to 65°C.

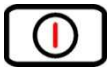
7.4. Anti-Legionella Function (U3)

The GH10NA controller is equipment in Anti-Legionella function which limit growth *Legionella pneumophilia* bacterium on HUW installation. This function is available for users when value **F00** service parameter was adjust on „02", „03" or „04".

The Legionella bacterium growth in water environment and the best condition is on 38–42^{0}C temperature. The Legionella bacterium can cause variety pneumonia disease, called Legion fever.

To activate the ANTI-LEGIONELLA function, set the *U3* setting to 1.

When the function is active, a blinking letter "L" is visible on the left part of the display, before the displayed temperature value.

You can turn off the function by modifying the *U3* setting to 0, or by pressing  . The anti-legionella function is also cancelled after a power down.

The ANTI-LEGIONELLA function has higher priority over other functions, therefore it is performed by the Controller in the first order (superior function).

When the function is activated, the temperature of water in the boiler is increased to 70°C and maintained for a period of 10 minutes.

TURNING ON OF THE ANTY-LEGIONELLA FUNCTION CAUSES RISE OF THE TEMPERATURE OF HUW WATER UP TO 70^{0}C.

EXTRA CAUSION WHEN USING HUW.
MAY RESULT IN BURNING !!!

8. OPERATING THE HUW BOILER

The GH10NA Controller allows connection of an additional pump to control the Hot Utility Water (HUW) in the boiler.

8.1. Instalation and Connections

To use the Hot Utility Water (HUW) heating option, perform the following actions:

1. connect the boiler according to the enclosed diagram (⇒ section 6.1.1 page 7).
2. install the HUW temperature sensor in the HUW storage

We recommend mounting HUW temperature sensor in GECO measuring drain.
You can not mount temperature sensors in measuring drain with water or oil !!!

3. connect the HUW temperature sensor to the Controller at the appropriate terminals as shown in Fig. 2
4. configure the HUW pump for operation (⇒ section 8.2 page 13).

HUW temperature sensor is additional equipment and it's not includes to the standard set controller GH10NA.
Additional equipment can be delivery according with additional order.

8.2. Configuration of Additional Pump

This procedure allows you to connect an additional pump that can be used as a mixing pump or a Hot Utility Water (HUW) pump operating with or without higher priority.

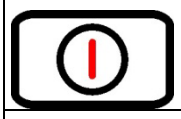
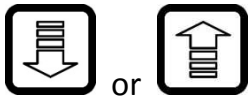
The HUW pump is started when the boiler outlet water temperature is higher than 40°C and higher than the water in the HUW boiler (to prevent cooling of the HUW boiler), and the HUW boiler temperature is lower than the temperature set in the *U2* setting (⇒ section **7.3** page 11).

Pump operation is indicated by a dot on the display next to the fan symbol.

If the boiler room is configured as shown in the diagram (⇒ section 6.1.1 page 7) then the boiler controller has no external alarm output, but allows to view the HUW boiler temperature

by pressing .

Use the following procedure to program operation of an additional pump in the Controller:

STEP 1	→	STEP 2	→	STEP 3	→	STEP 4
						
Display shows „– – – –”		Press and hold for 2s		Set the desired F00 value **00** – no pump operation **01** – mixing pump **02** – HUW pump winter mode without priority **03** – HUW pump winter mode with priority **04** – HUW pump summer mode		Save the new setting

8.3. HUW Priority

The GH10NA Controller allows to set operation of the HUW pump with priority. If you choose this mode of HUW pump operation, the hot utility water heating is a higher priority function in the Controller.

To do this, set the **F00** service setting to the value of “**3**”.

8.4. Summer Mode

The GH10NA Controller is equipped with a SUMMER MODE option that allows you to turn off the CH pump for the summer season, and the boiler operates only to supply the HUW water. To do this, set the **F00** service setting to the value of “**4**”.

9. ROOM THERMOSTAT

The GH10NA controller can cooperate with external room thermostat (⇒ Fig.1), which can put coal boiler in blockade position when temperature is reach in room.

During blockade position C.H. pump stay off after 4 minutes, for the moment when temperature in room is Reach (short circuit contact). The boiler start working in maintain operation mode.

The controller GH10NA passing from automatic operation to maintain operation mode just from time to time, when the boiler temperature is higher than minimum temperature adjust in **F03** service parameter or when HUW circulation require automatic operation controller (it depend of HUW Priority).

When room thermostat put controller in blockade position, the boiler is in maintain operation mode and boiler temperature fall down less than **F03** service parameter or HUW circulation need heating, than the controller come back to automatic operation mode until both conditions will be accomplish.

The controller supports the room panel of our manufacture. The controller responses to the panel orders if the controller is under the automatic operation mode. Where the malfunction occurs to the connection with the panel, the controller will resume the operation with the user programmed settings.
The illuminated dot on the segment on the left-hand side of the display shows that the communication link is operable.

10. TEMPERATURE LIMITER (STB)

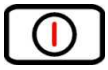
The GH10NA Controller can be equipped with an additional independent temperature limiter STB via terminals 15 and 16.

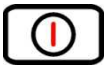
WHEN THE TEMPERATURE LIMITER IS NOT USED, TERMINALS 15 AND 16 SHOULD BE SHORTED.

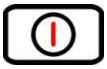
If due to boiler temperature rise the temperature limiter is activated and opens its terminals, it will disable feeder and fan power supply in order to stop fuel and air delivery do the boiler. After approximately 5s from limiter activation the Controller indicates the AL1 alarm.

Return to normal boiler operation is possible when the boiler temperature drops to a level enabling limiter reset (temperature level depends on the limiter model used).

For safety reasons the Controller does not resume automatic operation on its own.

For the Controller to resume operation you have to, after resetting the limiter, press  twice:

– pressing  for the first time cancels the alarm and disables the Controller,

– pressing  for the second time reactivates the Controller,

– pressing causes the Controller to switch to automatic operation mode.

CAPILLARY TUBE PUNCTURE OR BREAKAGE INDICATES THAT TEMPERATURE LIMITER FILLED WITH LIQUID LEAKS, WHICH RESULTS IN ABNORMAL OPERATION OF THE GH10NA CONTROLLER.

IN CASE IF THE ABOVE-MENTIONED DEFECT IS FOUND, IT WILL BE NECESSARY TO DISCONNECT TEMPERATURE LIMITER FROM THE GH10NA CONTROLLER, REMOVE IT AND REPLACE WITH A NEW DEVICE.

11. CONNECTION DEVICES TO THE GH10NA CONTROLLER

OUTPUTS			
14	L	—	Fan
12	N	—	Fan
11	L	—	---
09	N	—	---
06	L	—	Central Heating Pump C.H.
05	N	—	Central Heating Pump C.H.
08	L	—	H.U.W. Pump/ Mixing Pump
07	N	—	H.U.W. Pump/ Mixing Pump
02	N	—	Power Supply 230V
01	L	—	Power Supply 230V

INPUTS		
50, 51	—	Out water temperature sensor
52, 53	—	H.U.W /Return temp. sensor
54, 55	—	Flue gas temperature sensor
56, 57	—	Thermostat

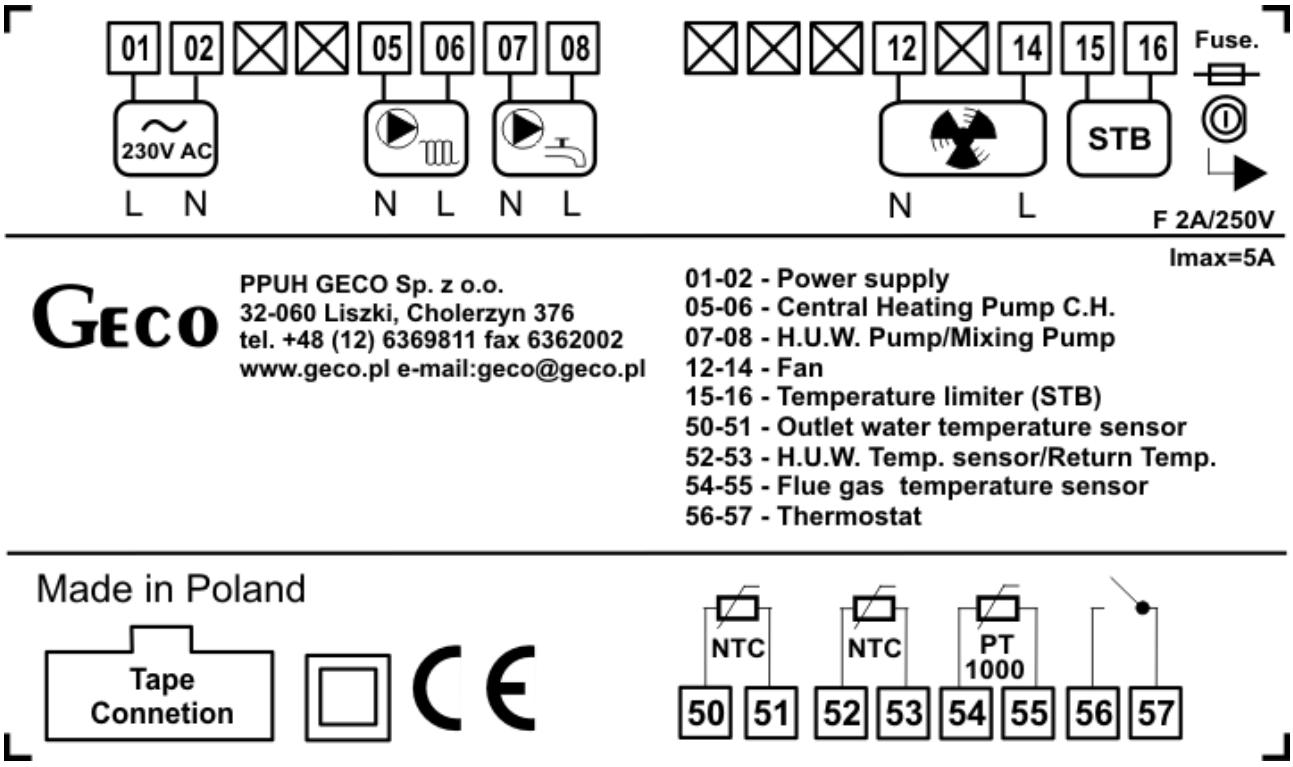
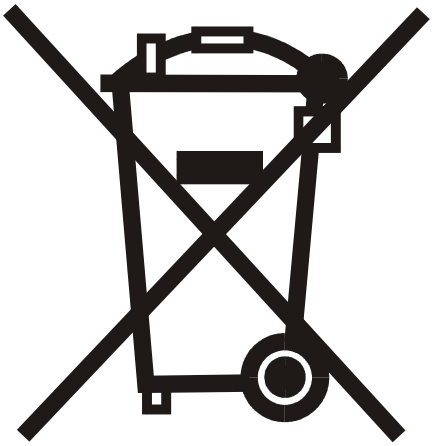


Fig. 1 Diagram of connection outputs and inputs devices and temperature sensor in the GH10NA controller.

ANY ADDITIONAL EQUIPMENT MAY BE CONNECTED TO THE GH10NA CONTROLLER ONLY BY PERSON LICENSED TO PERFORM ELECTRICAL INSTALLATION WORKS.

12. INFORMATION ON LABELLING AND COLLECTION OF WORN OUT ELECTRICAL AND ELECTRONIC EQUIPMENT



CAUTION!
This symbol placed on the product or its packaging indicates the need for selective collection of worn out electrical and electronic equipment. It means that this product should not be disposed of with other household wastes. Proper disposal of aged and worn out electrical and electronic equipment will help to avoid potentially adverse effects for environment and human health.
It is the user's responsibility to collect worn out equipment separately, and to return it to an authorized disposal company.

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